



TRANSPORTATION DATA COLLECTION PLAN

DRAFT

September 29, 2005

Data Collection Plan

Purpose

The data collection plan as outlined below shall be performed under Task AB. The data collection plan was developed to obtain existing transportation data including I-5 mainline and ramp terminal traffic counts, I-5 lane utilization / speed data, travel time information, signal timing plans, physical geometry, and I-5 ramp meter rates to support the I-5 Columbia River Crossing project transportation analysis. The extent of the data collection plan study area shall be from the Marquam Bridge in Portland, Oregon to the Pioneer Street Interchange in Ridgefield Washington.

Scope of Work

1. *Review existing data collected by local agencies including ODOT, Metro, City of Portland, WSDOT, RTC, and City of Vancouver.*

ODOT

ODOT collects the following types of data:

Automatic Traffic Recorder Stations (ATR's)

ODOT currently has approximately 150 ATR's located across the state with 16 of them located within the Portland Metro region. The ATR's collect directional volume data 24 hours a day seven days a week. ODOT added eleven new ATR stations in 2005. The ATR's are located on low volume highways, high volume highways, summer recreational routes, winter recreational routes, year round recreational routes (highways to the coast), and commuter routes.

Within the study area there are 3 ATR's along I-5 and one located along I-205 at the Glenn Jackson Bridge (ATR 26-024). The three ATR's along I-5 are the Marquam Bridge ATR (26-026), Minnesota ATR located between Skidmore Street and Alberta Street (ATR 26-019), and Interstate Bridge ATR (26-004).

Vehicle Classification Counts

Vehicle classification counts consist of separating vehicles into FHWA's 13-class system over a 24-hour period. ODOT counts each ATR location once every 3 years. Additional classification counts have been conducted along I-5 within the study area over the last few years as well as the next few years. In late September 2004, 24-hour directional classification counts were conducted at the following locations within and near the study area:

- I-5 at MP 307 (Between OR 99W and Hayden Island)
- I-5 at MP 303.3 (Between Killingsworth Street and Skidmore Street)
- I-5 at MP 301.1 (Between Yamhill Avenue and Morrison Street)
- I-205 at MP 23.5 (Between I-84 and Columbia Blvd.)

ODOT has planned to conduct the following 24-hour directional classification counts in September/October 2005:

- I-5 at MP 306.8 (Between Victory/Denver Blvd. and OR 99W)
- I-5 at MP 303.5 (Between I-405 junction and Skidmore Street)
- I-5 at MP 302.3 (Between I-84 and Broadway)
- I-5 at MP 300.37 (Marquam ATR)
- I-205 at MP 24.9 (Near Airport Interchange)

- I-84 at MP 0.52 (West Banfield ATR)
- I-84 at MP 12.13 (NE 162nd Overcrossing)

On-Ramp Loop Data

ODOT collects on-ramp loop data at ramp meter locations within ODOT Region 1. The loop data counts vehicles on the on-ramps as well as along the mainline prior to the on-ramp merge point. The mainline loops consist of individual loops for each individual lane.

On- and Off-Ramp Counts

ODOT also counts on- and off-ramp counts at different times. ODOT counted all of the on- and off-ramps along I-205 between the I-205/I-5 Interchange and the Airport Way Interchange in May - July 2005. The 24-hour counts were conducted using loop data and tube counters.

METRO

Metro typically obtains traffic count data from local jurisdictions versus collecting data themselves.

Regional Freight Data Collection – Phase II

This project is designed to complete freight data collection for the Portland metropolitan region. The Freight Data Collection – Phase II shall be based on findings from its Phase I predecessor. That project prioritized freight data needs in the Portland metropolitan region and developed a menu of methods to collect these data. The primary objectives of the Freight Data Collection – Phase II are as follows:

- A. Collect vehicle classification counts to better calibrate Metro's truck model;
- B. Conduct intercept surveys at key locations and/or use other data collection methods to obtain origin-destination, route and other freight movement information;
- C. Combine the results from Steps A and B with additional freight data from existing sources to identify truck and commodity movement (volumes, origin/destinations, route choice, and freight facility flow) in the Portland metropolitan region; and
- D. Develop a long-term regional truck count program.

Knowing specifics about commodity movements, such as their origin/destination, specific load factors, and patterns of transshipping/reloading will add geographic specificity to the regional and state travel forecasting models. With this addition, the models can be used to help identify existing bottlenecks and predict key corridors for future investments to increase business productivity.

CITY OF PORTLAND

The City of Portland Office of Transportation collects 24-hour counts for vehicles and vehicle speeds on a variety of Portland streets. From this data they can analyze traffic trends as well as speed data. The City typically use automatic traffic counters to collect 24-hour volume, speed, and classification counts.

WSDOT

WSDOT collects the following types of data:

Automatic Data Collection Stations (ADC's)

Similar to ODOT's ATR's, WSDOT's ADC's collect directional volume data 24 hours a day seven days a week. Some of the ADC's also collect vehicle classification data. The two ADC's

located within the study area which count both volumes and classification data are located along I-5 south of SR-500/39th Street (ADC P5) and along I-205 north of Mill Plain Boulevard Interchange (ADC R051).

In addition to the ATR's WSDOT has 8 to 12 RTMS (remote traffic microwave sensor) stations located on I-5 and I-205. Retrieving data has sometimes been problematic. These RTMS stations collect volume and occupancy data.

Short Counts

Short counts consist of counts conducted over short periods of time such as one- to three-day counts. These short counts when combined with ADC's develop overall balanced corridor volumes. Short counts consist of actual volume counts and 2-axle equivalent counts. WSDOT counted all of the I-5 on- and off-ramps between the Oregon Stateline and a Ridgefield, WA (i.e. SR-501) I-5 mainline count in November 2003. All of these same ramps were counted as 2-axle equivalent counts in October 2004. The major problem with the 2-axle equivalent counts is hourly axle conversion factors have not been developed for a daily period, therefore this type of data is typically used for ADT comparison. Similar to I-5, all of the ramps along I-205 between I-5 and the Oregon Stateline were counted as 2-axle equivalent counts in October 2004.

Vancouver HOV Lane Pilot Project

WSDOT has collected traffic data for the last few evaluation reports for the Vancouver HOV Lane Pilot Project. The data collection program consists of mainline counts along I-5 and I-205, auto occupancy counts along I-5 near 33rd Street, arterial volume counts, and travel time runs conducted during the HOV evaluation periods and by WSDOT's incident response vehicles on other days. Transit patronage in the corridor was also collected. WSDOT's incident response vehicles drive and monitor the I-5 corridor during peak periods to respond to incidents or motorist's maintenance needs on the corridor. WSDOT has collected travel time runs from the incident response vehicle between 99th Street Interchange and the Interstate Bridge during which the WSDOT vehicle did not stop to assist a motorist. WSDOT is planning to collect data for the next evaluation sometime in October 2005.

WSDOT Regional Freight Data Collection Study

WSDOT is in the process of collecting regional freight data throughout the Vancouver metropolitan region. The counts consist of manual and automated truck traffic volume counts along I-5 and I-205.

RTC

Southwest Washington Regional Transportation Council (RTC) maintains a Regional Traffic Count Program database for Clark County, Washington. This database contains over 400 intersections and their traffic count and turn movement volumes. They also have supplemental pages of data including a list of the highest volume intersections, historical volumes on the Columbia River Bridge crossings, and congestion management information.

Traffic count data along arterials has been maintained for the period from 1980 to present. Raw count data is collected by local jurisdictions including WSDOT, Clark County, City of Vancouver, and the City of Camas. RTC takes these raw counts and factors the data to represent average day and average month data. Raw count information is also available in pdf format linked to the database. Some intersections are analyzed frequently and have years and years worth of traffic count data while other intersection have only been counted a few times since 1980. Traffic count data is summarized for selected intersection by intersection leg. Directional Average Weekday (24 hour average), AM Peak

Hour (7-8 a.m.), PM Peak Hour (peak hour between 4-6 p.m.), and PM Peak Turn Movement (right, left, and through), are included in the summary.

RTC publishes an annual Congestion Management Monitoring report that focuses on improving transportation system performance information to decision-makers who must identify the most cost-effective strategies for addressing transportation congestion and improving mobility.

The Congestion Monitoring Report provides a comprehensive set of data for monitoring the performance of the transportation system. It contains information on traffic volumes, auto occupancy, transit ridership, travel time, and rideshare rates and more for different periods of the day. The full Congestion Monitoring Report provides profiles on the travel characteristics of 30 regional transportation corridors and detailed transportation data on individual facilities. . This project also cross-references the areas of concern with transportation solutions identified in current plans.

CITY OF VANCOUVER & CLARK COUNTY

The City of Vancouver and Clark County periodically collect traffic count data required for site impact analysis and corridor studies. This information is forwarded to RTC for inclusion in the Regional Traffic Count Database. They both typically obtain other traffic count data from the RTC database of traffic counts.

2. *To support the I-5 CRC transportation analysis, the transportation data collection program include ramp-to-ramp connection counts (i.e. ramps not controlled by intersection control), ramp terminal turning movement counts, I-5 mainline directional vehicle classification counts, lane utilization and speed counts, travel time runs, lane utilization, origin-destination patterns, signal timing plans, physical geometry data, and ramp meter data. The details of the transportation data collection program are summarized below. Tasks A, B, C, E and F shall be conducted concurrently if possible.*

A. COLLECTION OF RAMP-TO-RAMP TRAFFIC COUNTS

The on-ramp and off-ramp locations identified in **Table 1** list ramp-to-ramp traffic count locations. These locations lead directly to/from I-5 and represent ramp-to-ramp connections, which are not tied to traffic-controlled (signal or stop sign) interchange ramp terminals. Refer to **Table 2** for traffic-controlled ramp terminals. Ramp-to-ramp terminal counts will be collected for the 24-hour period during typical weekday operations, summarized by 15-minute increments, and include typical vehicle classifications (vehicles, light trucks, medium trucks, and heavy trucks). Ramp-to-ramp volumes will be collected concurrently throughout the corridor when the ramp terminal counts are collected.

**TABLE 1
RAMP-TO-RAMP CONNECTIONS REQUIRING TRAFFIC COUNTS**

#	Location	Direction	Roadway Facility	Comments
1	I-5 at I-84/Water Avenue	Northbound	Off-ramp	See note
2	I-5 at Morrison Street	Northbound	On-ramp	See note
3	I-5 at I-84	Northbound	On-ramp	
4	I-5 at I-405	Northbound	Off-ramp	
5	I-5 at Greeley Avenue	Northbound	Off-ramp	
6	I-5 at I-405	Northbound	On-ramp	

7	I-5 at SR-14	Northbound	Off-ramp	
8	I-5 at SR-14	Northbound	On-ramp	
9	I-5 at SR-500/39 th Street	Northbound	Off-ramp	See note
10	I-5 at I-205	Northbound	On-ramp	See note
11	I-5 at I-205	Southbound	Off-ramp	
12	I-5 at SR 500/39 th Street	Southbound	On-ramp	See note
13	I-5 at SR-14	Southbound	Off-ramp	
14	I-5 at SR-14/City Center	Southbound	On-ramp	See note
15	I-5 at I-405	Southbound	Off-ramp	
16	I-5 at Greeley Avenue	Southbound	On-ramp	
17	I-5 at I-405	Southbound	On-ramp	
18	I-5 at I-84	Southbound	Off-ramp	
19	I-5 at Morrison Street	Southbound	Off-ramp	See note
20	I-5 at I-84	Southbound	On-ramp	See note

Note: Where multiple ramps merge prior to entering I-5 or diverge after leaving I-5, counts will be conducted so as to obtain both volume components.

B. COLLECTION OF RAMP TERMINAL TURNING MOVEMENT COUNTS

To support the I-5 Columbia River Crossing traffic operations analysis 24-hour ramp terminal turning movement counts are required at each ramp terminal listed in **Table 2**. Ramp terminal counts will be collected concurrently with the ramp-to-ramp counts.

TABLE 2
RAMP TERMINAL INTERSECTIONS REQUIRING TURNING MOVEMENT COUNTS

#	Location	Direction	Roadway Facility	Comments
1	I-5 at Weidler	Northbound	Off-ramp	
2	I-5 at Broadway/Williams	Northbound	On-ramp	
3	I-5 at Going/Alberta Avenue	Northbound	Off-ramp	See note
4	I-5 at Alberta Avenue	Northbound	On-ramp	
5	I-5 at Portland Boulevard	Northbound	Off-ramp & On-ramp	
6	I-5 at Lombard Street	Northbound	EB & WB Off-ramp	
7	I-5 at Columbia Boulevard	Northbound/Southbound	Off-ramp/On-ramp	
8	I-5 at Victory Boulevard	Northbound	Off-ramp/On-ramp	
9	I-5 at Marine Drive	Northbound	Off-ramp	See note
10	I-5 at Denver/Interstate Ave.	Northbound/Southbound	On-ramp/Off-ramp	See note
11	I-5 at Marine Drive	Northbound	On-ramp	
12	I-5 at Hayden Island	Northbound	Off-ramp	

13	I-5 at Hayden Island	Northbound	On-ramp	
14	I-5 at City Center	Northbound	Off-ramp	
15	I-5 at Mill Plain Blvd.	Northbound	Off-ramp/On-ramp	See note
16	I-5 at 4 th Plain Blvd.	Northbound	Off-ramp/On-ramp	See note
17	I-5 at 39 th Street	Northbound	On-ramp	
18	I-5 at Main Street	Northbound	Off-ramp	
19	I-5 at Main Street	Northbound	On-ramp	
20	I-5 at 78 th Street	Northbound	Off-ramp/On-ramp	
21	I-5 at 99 th Street	Northbound	Off-ramp/On-ramp	
22	I-5 at 134 th Street	Northbound	Off-ramp	
23	I-5 at 179 th Street	Northbound	Off-ramp	
24	I-5 at 179 th Street	Northbound	On-ramp	
25	I-5 at Pioneer Street	Northbound	Off-ramp/On-ramp	
26	I-5 at Pioneer Street	Southbound	Off-ramp/On-ramp	
27	I-5 at 179 th Street	Southbound	Off-ramp/On-ramp	
28	I-5 at 134 th Street	Southbound	On-ramp	
29	I-5 at 99 th Street	Southbound	Off-ramp/On-ramp	
30	I-5 at 78 th Street	Southbound	Off-ramp/On-ramp	
31	I-5 at Main Street	Southbound	Off-ramp	
32	I-5 at Main Street	Southbound	On-ramp	
33	I-5 at 39 th Street	Southbound	Off-ramp/On-ramp	
34	I-5 at 4 th Plain Blvd.	Southbound	Off-ramp/On-ramp	
35	I-5 at Mill Plain Blvd.	Southbound	Off-ramp/On-ramp	
36	I-5 at Hayden Island	Southbound	Off-ramp/On-ramp	
37	I-5 at Marine Drive	Southbound	Off-ramp/On-ramp	See note
38	I-5 at Victory Blvd.	Southbound	On-ramp	
39	I-5 at Lombard Street	Southbound	WB & EB On-ramp	
40	I-5 at Portland Blvd.	Southbound	Off-ramp/On-ramp	
41	I-5 at Alberta/Going Street	Southbound	Off-ramp	See note
42	I-5 at Alberta Street	Southbound	On-ramp	
43	I-5 at Going Street	Southbound	On-ramp	
44	I-5 at Broadway Avenue	Southbound	Off-ramp	
45	I-5 at Weidler/Winning Way	Southbound	On-ramp	

Note: Where multiple ramps merge prior to entering I-5 or diverge after leaving I-5, counts will be conducted so as to obtain both volume components.

C. COLLECTION OF DIRECTIONAL, 24-HOUR, VEHICLE CLASSIFICATION COUNTS

Directional, 24-hour, vehicle classification counts are needed at the following ten locations. ODOT and WSDOT currently count five of the ten locations as part of their respective ATR and ADC count program. The remaining five locations plus the I-5 Interstate Bridge location (six total locations) need to be counted concurrently with the ramp-to-ramp and ramp terminal counts during typical weekday operations.

1. I-5 Mainline (NB & SB) on the Marquam Bridge (Marquam Bridge ATR 26-026 – ODOT)
2. I-5 Mainline (NB & SB) between Broadway & I-405 Ramps
3. I-5 Mainline (NB & SB) between Skidmore & Alberta St. (Minnesota ATR 26-019 – ODOT)
4. I-5 Mainline (NB & SB) between Columbia Blvd. & Victory Boulevard
5. I-5 Mainline (NB & SB) on Interstate Bridge (Interstate Bridge ATR 26-004 – ODOT)
6. I-5 Mainline (NB & SB) between 4th Plain Blvd. & SR 500/39th (ADC Station P5 – WSDOT)
7. I-5 Mainline (NB & SB) between 78th Street & 99th Street
8. I-5 Mainline (NB & SB) north of I-205 Connection
9. I-5 Mainline (NB & SB) north of Pioneer Street Interchange
10. I-205 Mainline (NB & SB) on Glenn Jackson Br. (Glenn Jackson Br. ATR 26-024 – ODOT)

D. COLLECTION OF LANE UTILIZATION / SPEED DATA

Directional lane utilization / speed trends along the I-5 mainline will be observed and documented for passenger vehicles and trucks. Lane utilization data will be classified into a size range (small, medium, and large vehicles) at all locations. Northbound and southbound observations/counts will be conducted over a 24-hour period during typical weekday operations. The lane utilization/speed data does not need to be conducted concurrently with the other counts. The specific locations requiring observations and counts are the following:

1. I-5 mainline midway between Morrison St. Bridge and I-84 Ramps (Portland)
2. I-5 mainline midway between Broadway/Weidler and I-405 Ramps (Portland)
3. I-5 mainline midway between I-405 and Skidmore/Alberta Streets (Portland)
4. I-5 mainline midway between Alberta Street and Portland Boulevard (Portland)
5. I-5 mainline midway between Victory Boulevard and Marine Drive (Portland)
6. I-5 Columbia River Bridge (midspan)
7. I-5 mainline midway between SR-14 and Mill Plain Blvd. (Vancouver)
8. I-5 mainline midway between Mill Plain Blvd. and 4th Plain Blvd. Interchanges (Vancouver)
9. I-5 mainline midway between 4th Plain Blvd. and SR-500 (Vancouver)
10. I-5 mainline midway between Main Street and 78th Street (Vancouver)

E. COLLECTION OF DIRECTIONAL TRAVEL TIME RUNS

Travel time runs along I-5 and I-205 will be completed during 4-hr AM and 4-hr PM peak hour turning movement counts using GPS units (both directions during peak periods). Travel time runs will be completed concurrently with Tasks A, B, and C to ensure proper model calibration.

F. COLLECTION OF AUTO OCCUPANCY

Directional auto occupancy counts along the I-5 mainline will be observed and documented for all vehicles. Northbound and southbound observations/counts will be conducted over a 4-hour AM and 4-hr PM peak period during typical weekday operations. The auto occupancy counts shall be conducted concurrently with the other counts (Tasks A, B, C, and E). The specific location requiring observation/count is at the Interstate Bridge.

G. COLLECTION OF ORIGIN-DESTINATION DATA

The origin-destination data collection plan is broken down into three parts. Part one is the collection of the raw data. Part two is the reduction of that raw data into a workable format. And part three is the post processing of the data which produces a final report tailored to particular needs.

Data Collection

Origin-destination data is collected with special high speed video cameras on each lane of roadway. The cameras run constantly and have a time stamp on the screen so that each plate will be captured with the corresponding time that it appeared. All of the cameras will have their times synced to within 30 seconds. Both the setup and the monitoring of the cameras is labor intensive. The cameras must be constantly monitored to determine that the proper shutter setting is being used based on the direction and intensity of the light.

Data Reduction

Once the cameras have collected the raw data, the next step is to get that data into a useable format. Each plate needs to be checked visually and hand entered into the database with its corresponding time stamp. This is an extremely time consuming and labor intensive process.

Post Processing

Once the data is into the proper format, it is run through a custom program developed to link origin-destination patterns. This data will include a route and a time for every vehicle in the study, and that information will be broken down into a summary of the OD's for the study period.

Origin-Destination Plan

Due to origin-destination data collection costs, the origin-destination data will only be collected for the peak direction during the peak 2-hr periods. The origin-destination collection plan will capture all of the on- and off-ramps within the BIA. Mainline data will be calculated using actual mainline counts and origin-destination data from the ramps. With the exception of the small percentage of temporary tags, missing plates, unreadable plates (due to dirt or obstruction), or vehicles changing lanes in the camera view, the origin-destination study will capture all of the vehicles that enter and exit within the BIA.

Table 3 lists the on- and off-ramps to be collected as part of the origin-destination study. This task does not need to be collected concurrently with the other tasks although mainline volume counts at the northern and southern limits must be counted concurrently with the origin-destination study in order to calculate all of the traffic patterns.

**TABLE 3
ORIGIN-DESTINATION RAMP COUNTS**

#	Location	Direction	Roadway Facility	# Of Lanes
1	I-5 at Victory/Denver Avenue	Northbound	On-ramp	1
2	I-5 at Marine Drive	Northbound	On-ramp	1
3	I-5 at Hayden Island	Northbound	Off-ramp	1
4	I-5 at Hayden Island	Northbound	On-ramp	1
5	I-5 at SR-14	Northbound	Off-ramp	1
6	I-5 at City Center	Northbound	Off-ramp	1

7	I-5 at SR-14	Northbound	On-ramp	1
8	I-5 at Mill Plain/4 th Plain Blvds.	Northbound	Off-ramp	2
9	I-5 at Mill Plain Blvd.	Northbound	On-ramp	2
10	I-5 at 4 th Plain Blvd.	Northbound	On-ramp	1
11	I-5 at SR-500/39 th Street	Northbound	Off-ramp	2
12	I-5 at SR-500/39 th Street	Southbound	On-ramp	2
13	I-5 at 4 th Plain Blvd.	Southbound	Off-ramp	2
14	I-5 at 4 th Plain Blvd.	Southbound	On-ramp	1
15	I-5 at Mill Plain Blvd.	Southbound	Off-ramp	2
16	I-5 at Mill Plain Blvd.	Southbound	On-ramp	1
17	I-5 at SR-14	Southbound	Off-ramp	1
18	I-5 at SR-14/City Center	Southbound	On-ramp	1
19	I-5 at Hayden Island	Southbound	Off-ramp	1
20	I-5 at Hayden Island	Southbound	On-ramp	1
21	I-5 at Marine Drive	Southbound	Off-ramp	1
22	I-5 at Marine Drive	Southbound	On-ramp	1
23	I-5 at Denver/Victory Blvd.	Southbound	Off-ramp	2

H. COLLECTION OF SIGNAL TIMING PLANS

Signal timing plans for all signalized intersections within the study area will be collected.

I. COLLECTION OF PHYSICAL INVENTORY

The following physical inventory information is needed:

- Pedestrian/Bicycle Facilities (existence and widths)
- Transit Facilities
- Freight Facilities
- Marine/Aviation Facilities
- Roadway Facilities (number of lanes, speeds, lane and shoulder widths, etc.)

J. COLLECTION OF I-5 RAMP METER RATES

Ramp meter rates along I-5 will be collected within the study area.

3. *Prepare transportation data collection plan for traffic counting firm and manage data collection.*

Consultant shall prepare transportation data collection plan for traffic counting firms. Data collection plan will include guidelines and deliverables. Consultant will coordinate and manage data collection process.

4. *Prepare interactive transportation data summary memorandum*

Consultant shall prepare interactive transportation data summary memorandum. Memorandum will include graphics including figures and tables summarizing existing transportation data.

Assumptions:

- Agencies (i.e. ODOT, City of Portland, Metro, WSDOT, RTC, and City of Vancouver) will provide requested traffic data.
- Data collection will be limited to specific not-to-exceed dollar value.

Deliverables:

- Develop transportation data collection plan for traffic counting firms.
- Prepare Interactive Transportation Data Summary Memorandum
- All electronic data collection data will be placed on Data Collection CD.